Remarks

I. Status of claims

Claims 1-21 were pending. Claims 3 and 11-21 have been withdrawn from consideration.

Claim 10 has been amended to change its dependency.

II. Claim rejections under 35 U.S.C. § 112

The Examiner has rejected claim 10 under 35 U.S.C. § 112, second paragraph.

The dependency of claim 10 has been changed to claim 9 to address the Examiner's concerns. The rejection of claim 10 under 35 U.S.C. § 112, second paragraph, now should be withdrawn.

III. Claim rejections under 35 U.S.C. § 103

The Examiner has rejected claims 1, 2, and 4-10 under 35 U.S.C. § 103(a) over Chou (U.S. 5,772,905) in view of Samsavar (U.S. 5,866,806).

For the purpose of the following discussion, the examiner is reminded that:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not on applicants' disclosure.

MPEP § 706.02(j) (emphasis added).

Claim 1 is an independent claim and each of claims 2 and 4-10 depends from independent claim 1. Claim 1 recites a lithographic method that comprises aligning a

patterned mold with respect to an alignment mark disposed on a substrate based upon interaction of a scanning probe with the alignment mark.

The Examiner has indicated that "Chou does not teach measuring a tunneling current to determine the alignment." In addition, the Examiner has asserted that (numbering added):

> (1) Samsavar teaches that capacitance sensing and measurement of tunneling current may both be used to determine the proximity or alignment of two features (column 9, lines 3-20).
>
> It would have been obvious to one skilled in the art to measure tunneling current to align the mold and substrate of Chou because (2) Chou generically teaches using an electrical alignment technique. Chou provides capacitance sensing as an example of an electrical alignment technique and (3) Samsavar teaches that the measurement of capacitance and the measurement of tunneling current are recognized in the art as equivalent means for determining the alignment of two features.

A. The cited references do not support the Examiner's assertions

As explained in detail below, each of the above-quoted assertions is not supported by the teachings of the cited references, at least with respect to the implications intended by the Examiner.

(1) "Samsavar teaches that capacitance sensing and measurement of tunneling current may both be used to determine the proximity or alignment of two features (column 9, lines 3-20)"

Samsavar's disclosure relates to a system for locating a feature of a surface. The system may be a profilometer or a scanning probe microscope (see col. 3, lines 51-58). A profilometer is an instrument for measuring the degree of roughness of a surface. A scanning probe microscope is an instrument for generating a three-dimensional topographical image of a surface based on the measurement of the positions of individual atoms on the surface.

Samsavar does not teach or suggest anything about lithographic alignment, much less anything about aligning a patterned mold with respect to an alignment mark disposed on a

substrate as recited in claim 1. The Examiner, however, has used the vague language "proximity or alignment of two features" out of context to imply that Samsavar's teaching relates to lithographic alignment when, in fact, it does not. The text of Samsavar's disclosure cited by the Examiner is reproduced below (col. 9, lines 3-20; emphasis added):

> A number of different types of features can be located and measured in the manner described above. In the semiconductor industry, it is frequently desirable to locate a tungsten plug, or a metal cluster or metal filled via hole, for measurement of a specific geometric, magnetic or electrical parameter. Thus, the tungsten plug, metal cluster or via hole filled with a metallic material may be located by sensing for changes in capacitance, magnetic force, electrical resistance or geometric properties of the site. Thus, when system 20 is operated in a non-contact operational mode, where thee tip is held at a small distance above the surface and scanned at a high speed over the surface along a search pattern, the sensor 28 senses changes in capacitance, tunneling current or magnetic parameter (e.g. magnetic force experienced by the probe tip and sensor 24) of the surface. The change in capacitance, tunneling current or magnetic force may indicate location of a tungsten plug, metal cluster or via hole filled with a metal.

In this disclosure, Samsavar merely teaches that the probe tip 26 in his system may be used to locate and measure metallic features, such as a tungsten plug, a metal cluster or a via hole filled with a metallic material, by sensing changes in capacitance, tunneling current or magnetic force. The only alignment performed by Samsavar's system is the alignment between the probe tip 26 and a site of interest on a surface. But the probe tip 26 is not a patterned mold and Samsavar does not even hint that the site of interest could be an alignment mark.

To summarize, contrary to the Examiner's implication, Samsavar does not teach or suggest anything about lithographic alignment, much less anything about aligning a patterned mold with respect to an alignment mark disposed on a substrate as recited in claim 1.

(2) "Chou generically teaches using an electrical alignment technique. Chou provides capacitance sensing as an example of an electrical alignment technique"

Contrary to the Examiner's assertion, Chou does not generically teach using an electrical alignment technique. The only general statements made by Chou relating to alignment of mold 10 and film 20 are Col. 6, lines 45-47):

> During the imprinting process, precise alignment of mold 10 and film 20 is crucial. This is achieved using optical or electrical alignment techniques.

Chou then proceeds to describe a single moiré-pattern-based optical alignment technique and a single capacitance-based electrical alignment technique. The teaching of a single optical alignment technique and a single electrical alignment technique is consistent with the second sentence quoted above. Chou does not describe any electrical alignment technique other than the capacitance-based electrical alignment technique.

To summarize, the only electrical alignment technique described in Chou is a capacitance-based electrical alignment technique. A description of one specific electrical alignment technique does not constitute a generic teaching of all possible electrical alignment techniques. Thus, there is no support whatsoever for the Examiner's implication that Chou provides some suggestion that his nanoimprint lithography apparatus could be modified for electrical alignment techniques other than the capacitance-based electrical alignment technique.

(3) "Samsavar teaches that the measurement of capacitance and the measurement of tunneling current are recognized in the art as equivalent means for determining the alignment of two features"

As a general statement, the Examiner's assertion is plainly incorrect. Once again, the Examiner has taken Samsavar's teaching out of context to reach an incorrect generalization.

Samsavar's disclosure can only be understood in the context of his feature location system, which includes probe tip 26 and sensor 24. In this context, it is clear that Samsavar merely teaches that the probe tip 26 and the sensor 24 may be used to sense "changes in capacitance, tunneling current or magnetic parameter (e.g., magnetic force experienced by the probe tip and sensor 24) of the surface" (col. 9, lines 15-17). The only reasonable

generalization that can be derived from this teaching is that measurement of capacitance and measurement of tunneling current are two possible ways of locating a metallic feature on a surface using a scanning probe tip of the type described in Samsavar. In addition, the only alignment performed by Samsavar's system is the alignment between the probe tip 26 and a site of interest on a surface. Samsavar does not even hint that anything other than the probe tip 26 and a site of interest could be aligned using his system.

It is unreasonable for the Examiner to conclude that Samsavar teaches that the measurement of capacitance and the measurement of tunneling current are recognized in the art as equivalent means for determining the alignment of two features because Samsavar's teaching relates only to a specific system configuration and a specific application domain (i.e., feature location and measurement), not a generalized context encompassing all possible application domains in which one "feature" is moved into a position relative to another "feature".

To summarize, Samsavar's teaching does not support the Examiner's generalized assertion "that the measurement of capacitance and the measurement of tunneling current are recognized in the art as equivalent means for determining the alignment of two features."

Thus, none of the assertions put forth by the Examiner in his explanation for why claims 1, 2, and 4-10 are obvious under 35 U.S.C. § 103(a) is supported by the cited references, at least with respect to the implications intended by the Examiner. Accordingly, the Examiner has failed to provide a reasonable explanation for why the combination of Chou and Samsavar is proper and, therefore, the Examiner has failed to establish a proper *prima facie* case of obviousness under 35 U.S.C. § 103. For at least this reason, the Examiner's rejection of claims 1, 2, and 4-10 35 U.S.C. § 103(a) should be withdrawn.

It appears that the Examiner improperly has engaged in hindsight reconstruction of the claimed invention, using applicants' disclosure as a blueprint for piecing together prior art to defeat patentability. Without a proper explanation for combining the cited prior art, the Examiner has failed to establish a proper *prima facie* case of obviousness and the rejection of claims 1, 2, and 4-10 should be withdrawn.

For these reasons, the Examiner is requested to cite art that supports of his unsubstantiated assertions. Alternatively, if the Examiner is aware of facts within his personal knowledge that provide the requisite factual basis and establish the requisite

motivation to support his deemed conclusion that the features recited in claims 1, 2, and 4-10 would have been obvious, the Examiner is requested to provide an affidavit in accordance with 37 CFR § 1.104(d)(2). Otherwise, the Examiner's rejection of claims 1, 2, and 4-10 should be withdrawn.

B. Moreover, no permissible combination of the cited references renders the claimed invention obvious

As explained above, Chou fails to teach or suggest anything about aligning mold 10 and film 20 based upon interaction of a scanning probe with an alignment mark and Samsavar fails to teach or suggest anything about lithographic alignment. Accordingly, no permissible combination of Chou and Samsavar would have led one of ordinary skill in the art at the time of the invention to a lithographic method that comprises aligning a patterned mold with respect to an alignment mark disposed on a substrate based upon interaction of a scanning probe with the alignment mark, as recited in claim 1.

For example, there is no teaching in Chou or Samsavar that would have led one of ordinary skill in the art at the time of the invention to modify Chou's nanoimprint lithography apparatus to include Samsavar's probe tip 26 and to use such a probe tip 26 to align mold 14 with respect to alignment mark 68, as proposed by the Examiner. In addition, even if there were some suggestion to combine Chou and Samsavar, given the locations of the alignment marks 64 and 68 shown in FIG. 9, it is unlikely that one of ordinary skill in the art would have had a reasonable expectation that a simple substitution of Samsavar's probe tip 26 for alignment mark 64 would have successfully produced a system that would have worked for its intended purpose because of the large distance that would have separated the probe tip 26 and the alignment mark 68. Thus, some additional, non-trivial modification of Chou's nanoimprint lithography apparatus would have been required to arrive at a system capable of performing the inventive lithographic method recited in claim 1. However, neither Chou nor Samsavar provides any guidance that would have led one of ordinary skill in the art at the time of the invention to modify Chou's nanoimprint lithography apparatus, much less to modify Chou's nanoimprint lithography apparatus in such a way as to achieve a system that would have been operable for its intended purpose.

For at least these reasons, the Examiner's rejection of independent claim 1 under 35 U.S.C. § 103(a) over Chou in view of Samsavar should be withdrawn.

Claims 2 and 4-10 incorporate the features of independent claim 1 and therefore are patentable for at least the same reasons.

IV. Conclusion

For the reasons explained above, all of the pending claims are now in condition for allowance and should be allowed.

Charge any excess fees or apply any credits to Deposit Account No. 08-2025.

Respectfully submitted,

Date: June 1, 2004

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